

147
"Made available under NASA sponsorship
in the interest of early and wide dis-
semination of Earth Resources Survey
Program information and without liability
for any use made thereof."

NTIS HC \$3.00

E 7.2 - 1 0.2 9.4

CR-129286

Iron-Absorption Band Analysis for the
Discrimination of Iron-Rich Zones

Lawrence C. Rowan
U.S. Geological Survey
Washington, D.C. 20242

1 November 1972

Type I Progress Report for Period 1 September-31 October 1972

Prepared for:
Goddard Space Flight Center
Greenbelt, Maryland 20771

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. Department of Commerce
Springfield VA 22151

Publication authorized by the Director, U.S. Geological Survey

(E72-10294) IRON-ABSORPTION BAND ANALYSIS
FOR THE DISCRIMINATION OF IRON-RICH ZONES
Progress Report, 1 Sep. - 31 Oct. 1972
L.C. Rowan (Geological Survey) 1 Nov.
1972 4 p

N73-13344

Unclas
00294

CSCL 08G 63/13

Type I Progress Report
ERTS-I

- a. Title: Iron-Absorption Band Analysis for the Discrimination of Iron-Rich Zones ERTS-A Proposal No.: SR 9648
- b. GSFC ID No. of P.I.: 1345
- c. Problems encountered during this reporting period include:
 - 1) Diffraction patterns on nearly all 70 mm negatives and positives. Apparently this problem has been solved, because these patterns are absent on recently received data. A complete listing of frames affected has been submitted to GSFC so that replacements can be processed.
 - 2) 70 mm negatives are very dense which makes generation of prints difficult. Prints are a required product in this analysis and should be provided by GSFC.
 - 3) Color composites are required in this analysis, and they are not readily available.
 - 4) Delays have been encountered in obtaining photographic materials, such as conventional black and white photomosaics from the Sioux Data Center.
 - 5) Scale of 70 mm images is variable.
- d. Accomplishments during the reporting period include:
 - 1) Comparative lineament analysis--Lineaments have been plotted on MSS Bands 5 and 7 for approximately 60 percent of the Nevada site. The southeastern California area has not been analyzed. The analysis shows that in general lineaments are more abundant on Band 7 than on Band 5 images. Of the area analyzed, about 50 percent has been compared with published geologic maps (usually at 1:250,000 scale) to determine the nature of these lineaments. This comparison indicates that the frequency of lineaments is about twice as large on the images. Most of the lineaments which had been mapped previously are known or probable faults, although a significant number are lithologic contacts. A few lineaments were found to be cultural features, such as roads and railroad tracks. None of the lineaments have been checked in the field, and therefore the significance of the unmapped lineaments is not known.
 - 2) Spectral reflectance analysis--Approximately 160 images have been examined for film density differences which might be attributed to differences in the spectral reflectance of rocks and

soils. In general, the density contrast is largest in MSS Band 7. This is explained in part by variations in the distribution of vegetation, an important geological parameter for remote mapping, but it is true also for sparsely vegetated areas. This observation suggests that reflectance differences are generally larger in the near-infrared or that atmospheric attenuation is less severe in the near-infrared than in the visible bands. Future research will be directed towards this problem. During the examination of these images obvious differences were noted from the visible to the near-infrared bands in four areas. In three cases, the density level of one rock type was constant while another type was obviously darker in the near-infrared bands, particularly no. 7, which indicates a decrease in near-infrared reflectance for the latter rock type. Although these areas have not been field checked, the reduced near-infrared reflectance is probably due to optical absorption. The fourth area is particularly interesting, because in this case an ash-flow tuff and rhyolite series becomes significantly brighter in Band 7. This area must be checked in the field before an adequate explanation is possible.

3) Considerable library research has been carried out in connection with the above analysis.

- e. Analysis of ERTS-I images of Nevada has followed two courses: comparative lineament mapping and spectral reflectance evaluation. The comparative lineament mapping was conducted by mapping lineament on 9 x 9 inch prints of MSS Bands 5 and 7, transferring the data to a base map, and comparing the results with existing geologic maps. The most significant results are that lineaments are more numerous on the Band 7 images, and approximately 100 percent more were mapped than appear on existing maps. Although the geologic significance of these newly mapped lineaments will not be known until they are checked in the field, many are probably faults.

Spectral analysis has been limited to visual comparison among the four MSS bands. In general, higher scene contrast is shown in the near-infrared bands (6 and 7) than in the visible wavelength bands (4 and 5). Although the contrast is in some cases related to the distribution of vegetation, this observation is valid in many areas of very sparse vegetative cover. In addition, four areas of variable aerial extent show significant variations in film density among the bands suggesting spectral reflectance variations among the rock units.

The economic implications of these results derive chiefly from the greater efficiency that can be obtained by using near-infrared as well as visible wavelength images.

f. None.

g. See section c.

h. N.A.

i. No forms have been received.

j. N.A.

k. N.A.